REMARKS

Claims 1 and 3-24 are now pending in the application with Claims 1 and 3-17 under consideration. Claims 1 and 15 are independent. The subject-matter of dependent Claim 2 has been incorporated into independent Claim 1, and Claim 2 has been cancelled.

The 35 USC 112 rejections have been addressed by careful review and suitable amendment of each of Claims 3, 5-8 and 11-17 to address the antecedent issues raised in the Action.

Applicants thank the Examiner for the indication of withdrawal of the previous rejections.

Rejections based on US 5,733,661 (Ue et al.)

As regards Claim 1 and 3-14:

In the Official Action (pages 4-5), Claims 1, 3-4, 7, 9, 11 and 13-16 were rejected under 35 USC 102(b) as anticipated by, or in the alternative under 35 USC 103(a), as obvious over Ue et al. This reference claims a composite oxide film formed on a substrate and which comprises at least one oxide of a metal selected from the group consisting of Al, Ti, Zr, Hf, Nb, and Ta, said oxide containing anions of at least one member selected from the group consisting of organic carboxylic acid salts and inorganic oxoacid salts.

The starting point for making the composite film of the reference may be e.g. a thin metal film deposited on a substrate (col. 4, line 26). The metal is then anodized in a substantially anhydrous non-aqueous electrolytic solution containing an organic carboxylic acid salt and/or an inorganic oxoacid salt (col. 3, lines 57-62).

According to present Claim 1 as amended (and Claims 3-14 which depend therefrom), briefly stated, an anodized electrode is made by a stepwise procedure involving vacuum deposition of a defined porous coating on a substrate, then increasing the effective surface area of the porous coating by increasing the total pore volume of said porous coating and/or increasing the average pore width in the porous coating, and finally producing electrolytically at least one anodized valve oxide layer overlaying the surface of the porous coating.

In the present invention, increasing the effective surface area of the porous coating may be practiced by, e.g. in Claim 7, anodization in presence of an electrolyte which comprises a saturated dicarboxylic acid salt selected from the ammonium and alkali metal salts, and removing

thus-formed valve metal oxide(s) by use of a halogen-free chemical etchant *in situ* or in a discrete subsequent sub-step. According to Claim 9, the salts may be adipates and the etchant may be selected from chromic, oxalic and/or phosphoric acid.

It would be evident to the skilled addressee of the present application, that in the present invention, certain dicarboxylic salts may be used for electrolytic oxidation in the pores of the porous coating and that the thus-formed metal oxides may be removed using e.g. chromic, oxalic and/or phosphoric acid, and that these salts and acids are used merely as reactants. Moreover, it would be clear from the practical examples that, in contrast to cited Ue et al. reference, such salts and acids do not remain in the anodized electrode.

In the present amendment, the subject of Claim 2, which specifies increasing the total pore volume of said porous coating and/or increasing the average pore width in the porous coating, has been incorporated into Claim 1. This feature is neither disclosed by nor made obvious by the cited reference, and indeed, Claim 2 was not rejected because of cited Ue, either under 35 USC 102 on page 4 of the Official Action, or under 35 USC 103 on pages 4-5 of the Official Action (or even when citing Ue in view of Yahalom and/or Power under 35 USC 103 on pages 7-9 of the Official Action).

Thus, it is believed to be clear that Claim 1 as amended, as well as Claims 3-14 dependent therefrom, are patentable over Ue under 35 USC 102, and are also patentable over Ue under 35 USC 103, whether this reference is taken alone, or together with cited Yahalom and/or Power. (The specific rejections under 35 USC 103 will however be further discussed below.)

Moreover, Claims 5, 8, 10, 12 and 17 were rejected in the Official Action (pages 7-8) under 35 USC 103 as being unpatentable over Ue et al in view of Yahalom (US 5,382,347). The disclosure of Ue has been described above. Yahalom discloses a method for producing protecting layers on a metal selected from aluminum, titanium and zirconium, or alloys thereof, which involves at least two anodic oxidation steps producing oxide layers and a thermal treatment which is carried out before or simultaneously with last anodic oxidation step.

These rejected claims are all indirectly dependent from Claim 1 and thus include all the features recited in Claim 1, and in particular the feature that the step of increasing the effective surface area of the porous coating is implemented by increasing the total pore volume of the porous coating and/or increasing the average pore width in the porous coating. Also, it is noted

hat just as Ue was not cited against (now canceled) Claim 2 under 35 USC 102, so it has not been cited against canceled Claim 2, which specifies this implementing feature, either alone in combination with other references against Claim 2 under 35 USC 103.

Moreover, it is noted that Yahalom is directed particularly to machine parts (Claim 20 and col. 5, lines 65-5) and away from capacitor anodes (Claim 1 and col. 7, lines 18-20). Consequently, these rejected claims which include the implementing feature just referred to, and which is recited in Claim 1, are patentable over Ue in view of Yahalom under 35 USC 103.

Furthermore, Claim 6 was rejected in the Official Action (pages 8-9) under 35 USC 103 as being unpatentable over Ue et al in view of Yahalom and further in view of Power (US 5,382,347). The disclosures of Ue and Yahalom have been described above.

Power discloses (col. 1, lines 37-45) a solid electrolytic capacitor which consists in essence of a porous body formed under high pressure from particles of a film-forming metal, an anodically formed oxide film covering the entire surface area of the porous body, a solid electrolyte consisting of a semiconductive material in intimate contact with the oxide film, and an electrically conductive layer overlying the semiconductive material. More specifically (col. 2, lines 38-59), the solid electrolyte is MnO_2, the anodizing electrolyte is aqueous nitric acid and the re-anodizing electrolyte is acetic acid. The specified porous metal is composed of compressed particles of tantalum, and after the re-anodizing step, the porous body is heated to remove residual acetic acid (e.g. col. 4. lines 53-4, and Claims 1 and 4).

Power does not add anything to the combination of Ue and Yahalom., which makes it more relevant to the essential steps of Claim 6, as recited in Claim 1, namely, the implementing step, and the step of coating the surface of a substrate by vacuum deposition thereon of a porous coating comprising valve metal(s) and or valve metal oxide(s). In Power, the porous body is assembled under pressure which actually teaches away from a vacuum coating process, and in fact Power does not appear to disclose vacuum coating of a substrate at all. Thus, both Yahalom and Power teach away from the invention and none of Ue, Yahalom and Power either disclose or suggest the implementing step of Claim 1. Consequently, Claim 6 is patentable over the combination of Ue, Yahalom and Power, cited under 35 USC 103.

As regards Claims 15-17:

In independent Claim 15 (and Claims 16-17 which depend therefrom), briefly stated, the effective surface area of a vacuum deposited porous coating comprising aluminum and aluminum oxide is increased by electrolytic anodization in presence of an electrolyte which comprises a saturated dicarboxylic acid salt selected from the ammonium and alkali metal salts, and removing thus-formed valve metal oxide(s), as well as at least part of the aluminum oxide component of the deposited porous coating, by use of a halogen-free chemical etchant *in situ* or in a discrete subsequent sub-step; and finally producing electrolytically at least one anodized aluminum oxide layer overlaying the surface of the porous coating.

Although Claims 15 and 16 were included in the claims rejected based upon cited Ue, under 35 USC 102 or 35 USC 103 on page 4 of the Official Action, the cited reference neither discloses nor suggests to a person of the art that the salts which feature in Claim 1 of Ue may be used to form oxides which are then removed with a chemical etchant, as in present Claim 15.

It would be evident to the skilled addressee of the present application, that in the present invention according to Claims 15-17, the recited dicarboxylic salts are used for electrolytic oxidation in the pores of the porous coating, the thus-formed metal oxides being removed using a chemical etchant, e.g. chromic, oxalic and/or phosphoric acid, and that these salts and acids are used merely as reactants. Moreover, it would be clear from the practical examples that, in contrast to cited Ue et al. reference, such salts and acids do not remain in the anodized electrode.

Thus, it is believed to be clear that Claim 15, as well as Claims 16 and 17 which depend therefrom, are patentable over Ue under 35 USC 102, and are also patentable over Ue under 35 USC 103. (The specific rejections under 35 USC 103 will be discussed below.)

Also, Claim 17 was rejected under 35 USC 103 in the Official Action (pages 7, 8) as being unpatentable over Ue in view of Yahalom. However, Claim 17 depends from Claim 16 which in turn depends from independent Claim 15. Thus Claim 17 includes all the features of Claim 15, e.g. that anodizing the porous coating in presence of dicarboxylic acid salts gives rise to oxides which are removed by use of a chemical etchant. The disclosures of Ue and Yahalom have been described above. Neither Ue nor Yahalom describe or suggest these essential features of Claim 17 as recited in Claim 15, and thus these references cannot render Claim 17 unpatentable under 35 USC 103.

Rejections based on US 3,203,793 (Hand)

As regards Claim 1 and 3-6:

In the Official Action (pages 5-7), Claims 1-4 were rejected under 35 USC 103(a), as unpatentable over Hand; Claim 5 was similarly rejected over Hand in view of Brown et al. (US 3,331,993); and Claim 6 was similarly rejected over Hand in view of Brown and Power (US 2,989,447).

As noted above, present Claim 1 as amended and its dependent claims relate to a stepwise method in which an anodized electrode is made by vacuum deposition of a defined porous coating on a substrate, then the effective surface area of the porous coating is increased by increasing the total pore volume of the porous coating and/or increasing the average pore width in the porous coating, and finally producing electrolytically at least one anodized valve oxide layer overlaying the surface of the porous coating.

Briefly stated, cited Hand (see col. 1, lines 12-39) discloses a method for making a metal body with a porous surface, which comprises heating a shaped metal alloy body consisting of at least one of niobium (=columbium) and tantalum, together with at least one of titanium and vanadium. The heating is conducted under vacuum at $\geq 1600^{\circ}C$ but below the melting point, whereby relatively volatile metals (titanium, vanadium) are evaporated, leaving a porous surface of relatively non-volatile metals (niobium, tantalum). The porous surface is anodized and may then be used as an electrode.

It will be evident to the skilled person that cited Hand neither discloses nor suggests formation of a porous surface on a substrate by vacuum deposition of valve metals and/or their oxides, as is required by present Claim 1. In cited Hand, the porous surface is created in the substrate itself by removal therefrom, by means of evaporation, of relatively volatile metals in the substrate at very high temperatures. This is very different from the present process in which a porous coating of valve metals and/or their oxides is vacuum deposited on a substrate. In Hand it cannot reasonably be said that the disclosed method creates a coating of any kind on a substrate, by any method, it creates only pores or cavities in an existing substrate.

Thus, it is submitted that Claim 1 and its dependent Claims 3-14 are clearly patentable over cited Hand under 35 USC 103.

In the Official Action, Claim 5 was rejected under 35 USC 103(a), as unpatentable over Hand in view of Brown et al., apparently on the basis that Brown discloses annealing before anodizing. However, Claim 5 depends from Claim 4 which in turn depends from Claim 3, which depends from Claim 1. Thus, rejected Claim 5 is characterized by all the features in Claim 1, including the step of coating the surface of a substrate by vacuum deposition thereon of a porous coating comprising valve metal(s) and or valve metal oxide(s).

In cited Brown, an oxide film is formed on titanium metal by anodizing in a non-aqueous electrolyte containing a phosphorus compound containing at least 80% by weight P_2O_5. For use as the anode in an electrolytic capacitor, the titanium is highly purified by subjecting it to at least three electrical meltings, after which it may be annealed and anodized.

Neither Hand nor Brown et al. refer to one of the essential steps of Claim 5, as recited in Claim 1, namely, the step of coating the surface of a substrate by vacuum deposition thereon of a porous coating comprising valve metal(s) and or valve metal oxide(s). Thus, Claim 5 is patentable over the combination of Hand and Brown et al., cited under 35 USC 103.

In the Official Action, Claim 6 was rejected under 35 USC 103(a), as unpatentable over Hand in view of Brown et al., and in further view of Power, apparently on the basis that Brown discloses annealing before anodizing, plus the apparent disclosure in Power of washing an anodized body with distilled water, to obtain a longer life capacitor. However, Claim 6 depends from Claim 5, which depends from Claim 4, which in turn depends from Claim 3, which depends from Claim 1. Thus, rejected Claim 6 is characterized by all the features in Claim 1, including the step of coating the surface of a substrate by vacuum deposition thereon of a porous coating comprising valve metal(s) and or valve metal oxide(s).

Power discloses (col. 1, lines 37-45) a solid electrolytic capacitor which consists in essence of a porous body formed under high pressure from particles of a film-forming metal, an anodically formed oxide film covering the entire surface area of the porous body, a solid electrolyte consisting of a semiconductive material in intimate contact with the oxide film, and an electrically conductive layer overlying the semiconductive material. More specifically (col. 2, lines 38-59), the solid electrolyte is MnO_2, the anodizing electrolyte is aqueous nitric acid and the re-anodizing electrolyte is acetic acid. The specified porous metal is composed of compressed

particles of tantalum, and after the re-anodizing step, the porous body is heated to remove residual acetic acid (e.g. col. 4. lines 53-4, and claims 1 and 4).

Power does not add anything to the combination of Hand and Brown et al., which makes it more relevant to one of the essential steps of Claim 6, as recited in Claim 1, namely, the step of coating the surface of a substrate by vacuum deposition thereon of a porous coating comprising valve metal(s) and or valve metal oxide(s). In Power, the porous body is assembled under pressure which actually teaches away from a vacuum coating process, and in fact Power does not appear to disclose vacuum coating of a substrate at all. Thus, Claim 6 is patentable over the combination of Hand, Brown et al. and Power, cited under 35 USC 103.

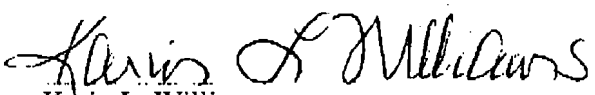
As regards Claims 7-17:

It is noted that none of these claims was rejected under 35 USC 103, on the basis of Hand, taken either alone or in combination with other references.

CONCLUSION

It is believed that sufficient reasons have been given above for withdrawal of the 35 USC 102(b) and 103(a) rejections. Should the Examiner be of the view that an interview would expedite consideration of the application, or if the proposed amendment raises any issues that may be resolved by a telephone discussion, request is respectfully made that the Examiner telephone the Applicant's attorney at (908) 518-7700 in order that any outstanding issues be resolved.

Respectfully submitted,



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